Name ______________________ Date ____________

Study Guide Worksheet 1-6

Measurement: The Metric System

The metric system is a base 10 system. The meter is the basic unit of length. The liter is the basic unit of capacity. The gram is the basic unit of mass.

Prefix	Meaning	Length	Capacity	Mass
kilo-	1,000	kilometer (km)	kiloliter (kL)	kilogram (kg)
hecto-	100	hectometer (hm)	hectoliter (hL)	hectogram (hg)
deka-	10	dekameter (dam)	dekaliter (daL)	dekagram (dag)
	1	meter (m)	liter (L)	gram (g)
deci-	0.1	decimeter (dm)	deciliter (dL)	decigram (dg)
centi-	0.01	centimeter (cm)	centiliter (cL)	centigram (cg)
milli-	0.001	millimeter (mm)	milliliter (mL)	milligram (mg)

Units may be changed by multiplying or dividing by multiples of 10.

Examples

2,200 mL = ____ L
There are 1,000 mL in 1 L.
Divide 2,200 by 1,000.
2,200 mL = 2.2 L

8.9 km = ____ m
1 km = 1,000 m
Multiply 8.9 by 1,000.
8.9 km = 8,900 m

5,500 dg = ____ hg
There are 10 dg in 1 g.
5,500 dg = 550 g
There are 100 g in 1 hg.
550 g = 5.5 hg
5,500 dg = 5.5 hg

Complete each sentence.

1. 100 g = ____ hg
1

2. 10,000 m = ____ km
10

3. 10 daL = ____ L
100

4. 3,000 mg = ____ g
3

5. 7.90 mL = ____ L
0.0079

6. 80 m = ____ hm
0.8

7. 2.46 m = ____ mm
2,460

8. 4.52 L = ____ mL
4,520

9. 789 g = ____ kg
0.789

10. 0.5 L = ____ mL
500

11. 0.707 g = ____ mg
707

12. 90 L = ____ hL
0.9

13. 8.6 dm = ____ m
0.86

14. 450 cm = ____ m
4.5

15. 5,000 g = ____ kg
5

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Study Guide Worksheet 1-7

Measurement: The Customary System

The chart shows some customary units and equivalents.

Length	Capacity	Weight
12 inches (in.) = 1 foot (ft)	8 fluid ounces (oz) = 1 cup (c)	16 dry ounces (oz) = 1 pound (lb)
3 ft = 1 yard (yd)	2 c = 1 pint (pt)	2,000 lb = 1 ton (T)
5,280 ft = 1 mile (mi)	2 pt = 1 quart (qt)	
	4 qt = 1 gallon (gal)	

Multiply to change a larger unit to a smaller unit.
Divide to change a smaller unit to a larger unit.

Examples

3 mi = ____ ft
Miles are larger than feet.
Multiply: $3 \times 5{,}280$
3 mi = 15,840 ft

32 c = ____ gal
Cups are smaller than gallons.
1 gal = 4 qt = 8 pt = 16 c
Divide: $32 \div 16$
32 c = 2 gal

Complete each sentence.

1. 15 ft = ____ yd
5
2. 8 c = ____ pt
4
3. 5 lb = ____ oz
80
4. 2 T = ____ lb
4,000
5. 3 gal = ____ qt
12
6. 9 yd = ____ ft
27
7. 2 mi = ____ ft
10,560
8. 1.5 gal = ____ qt
6
9. 24 oz = ____ lb
1.5
10. 3,000 lb = ____ T
1.5
11. 5 c = ____ pt
2.5
12. 1.5 ft = ____ in.
18
13. 2 qt = ____ c
8
14. 72 in. = ____ yd
2
15. 24 oz = ____ pt
1.5
16. 42 in. = ____ ft
3.5
17. 1,000 lb = ____ T
0.5
18. 9 pt = ____ c
18

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Study Guide Worksheet 1-9

Algebra: Powers and Exponents

A power can be used to show a number multiplied by itself.

Example $3 \times 3 \times 3 \times 3$ can be written 3^4. It is read, "3 to the fourth power."

The exponent, 4, tells how many times the base, 3, is used as a factor.

Base → 3^4 ← Exponent

Example Write $2 \times 2 \times 3 \times 2 \times 2 \times 3$ using exponents.

2 is used as a factor 4 times. 3 is used as a factor 2 times.
$2 \times 2 \times 3 \times 2 \times 2 \times 3 = 2^4 \times 3^2$

Multiply to find the value of expressions with exponents.

Example Find the value of 3^4.
$3^4 = 3 \times 3 \times 3 \times 3 = 81$

Example Find the value of $2^4 \times 3^2$.
$$2^4 \times 3^2 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 16 \times 9 = 144$$

Write each product using exponents.

1. $7 \times 7 \times 7 \times 6 \times 6 \times 6 \times 6$
   $7^3 \times 6^4$
2. $2 \times 2 \times 5 \times 5 \times 9 \times 9$
   $2^2 \times 5^2 \times 9^2$
3. $10 \times 10 \times 8 \times 8$
   $10^2 \times 8^2$

Find the value of each expression.

4. 10^5
   100,000
5. 2^5
   32
6. 7^2
   49
7. $3^3 \times 4^2$
   432
8. $1^9 \times 5^3$
   125
9. $100^2 \times 6^2$
   360,000
10. 12^2
    144
11. $2^4 \times 1^6$
    16
12. 50^3
    125,000
13. $7^2 \times 7^2$
    2,401
14. $4^2 \times 3^2 \times 2^2$
    576
15. $9^1 \times 9^2$
    729

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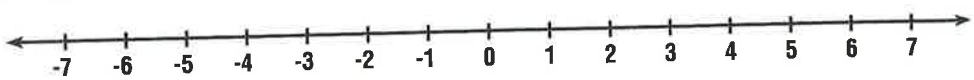
Study Guide Worksheet 3-2

Comparing and Ordering

To compare integers, think of a number line. The number farther to the right on the number line is greater.



Examples

Use >, < or = to compare the integers.

1. -7 ____ 7 A negative integer is less than a positive integer.
$-7 < 7$

2. -4 ____ -6 -4 is to the right of -6.
$-4 > -6$

3. 2 ____ |-2| The absolute value of -2 is 2.
$2 = |-2|$

Complete using >, <, or =.

1. -9 ____ 7 <

2. 0 ____ -5 >

3. -43 ____ -34 <

4. |4| ____ -4 >

5. |-7| ____ |7| =

6. 12 ____ -12 >

7. |-1| ____ 0 >

8. |-20| ____ |20| =

9. -72 ____ -50 <

Order the integers in each set from least to greatest.

10. {17, 12, 1, -9, -6} -9, -6, 1, 12, 17

11. {-67, 0, -45, -53, -43, 45} -67, -53, -45, -43, 0, 45

Order the integers in each set from greatest to least.

12. {90, -180, -60, 65, 0, -11} 90, 65, 0, -11, -60, -180

13. {-74, 47, -89, 13, 31, -8} 47, 31, 13, -8, -74, -89

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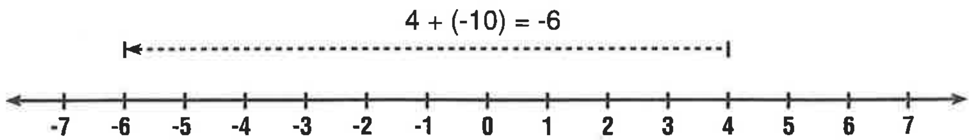
Study Guide Worksheet 3-3

Adding Integers

To add integers, think of a number line. Locate the first addend on the number line. Move right if the second addend is positive. Move left if the second addend is negative.

Example Find the sum $4 + (-10)$.
Start at 4. Since -10 is negative, move left 10 units.



When you add integers, remember:

The sum of two positive integers is positive.
The sum of two negative integers is negative.
The sum of a positive integer and a negative integer is positive if the positive integer has the greater absolute value and negative if the negative integer has the greater absolute value.

Examples

$t = 24 + (-13)$ Compare absolute values.
$|24|$ ___ $|-13|$
$24 > 13$ The sum is positive.
$24 - 13 = 11$
$t = 11$

$-17 + 16 = m$ Compare absolute values.
$|-17|$ ___ $|16|$
$17 > 16$ The sum is negative.
$17 - 16 = 1$
$m = -1$

Solve each equation.

1. $h = 15 + (-10)$ 5
2. $-20 + (-9) = g$ -29
3. $s = -9 + 39$ 30
4. $-50 + 20 = p$ -30
5. $y = -11 + (-19)$ -30
6. $z = 12 + 15$ 27
7. $500 + (-250) = w$ 250
8. $e = 48 + (-8)$ 40
9. $-80 + (-20) = v$ -100
10. $t = -109 + 49$ -60
11. $544 + 206 = b$ 750
12. $4 + (-16) = d$ -12

Evaluate each expression if a = 10, b = -10, and c = 5.

13. $a = 23$ 33
14. $b + (-7)$ -17
15. $b + c$ -5
16. $-20 + c$ -15
17. $a + (-56)$ -46
18. $23 + b$ 13

Glencoe Division, Macmillan/McGraw-Hill

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Study Guide Worksheet 3-4

More About Adding Integers

You can use the associative property and the commutative property to help add integers.

Associative Property: Addends may be grouped in any way. The sum will remain the same.

Example Group the first two addends.

Solve
$m = -4 + (-6) + 9$
$m = [-4 + (-6)] + 9$
$m = -10 + 9$
$m = -1$

Group the second two addends.

Check
$m = -4 + (-6) + 9$
$m = -4 + [(-6) + 9]$
$m = -4 + 3$
$m = -1$

Commutative Property: Integers may be added in any order. The sum will remain the same.

Example

Solve
$y = 40 + (-25) + 60$
$y = 40 + 60 + (-25)$
$y = 100 + (-25)$
$y = 75$

Check Use the associative property.
$y = [40 + (-25)] + 60$
$y = 15 + 60$
$y = 75$

Solve each equation. Check by solving another way.

1. $h = 7 + (-8) + (-7)$
-8

2. $-20 + 5 + (-10) + 3 = n$
-22

3. $r = 6 + (-9) + 11$
8

4. $-9 + (-3) + 12 + (-3) = f$
-3

5. $c = 10 + (-15) + (-8) + 7$
-6

6. $-6 + (-6) + 6 = k$
-6

7. $v = 26 + 24 + (-16) + (-1)$
33

8. $(-11) + 15 + (-4) + 3 = g$
3

9. $x = -7 + (-8) + 15$
0

Evaluate each expression if $m = -5$, $n = 7$, and $p = 10$.

10. $m + (-9) + p$
-4

11. $-10 + n + p + (-7)$
0

12. $(-8) + m + (-1)$
-14

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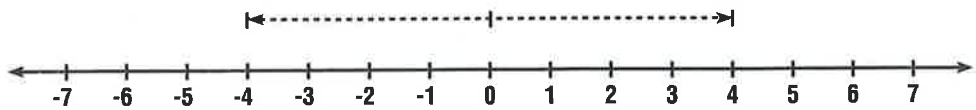
Study Guide Worksheet 3-5

Subtracting Integers

An integer and its opposite are the same distance from 0 on a number line. 4 and -4 are opposites.



The sum of an integer and its opposite is 0. $-4 + 4 = 0$

To subtract an integer, add its opposite.

Examples

$4 - 8 = y$
$4 + (-8) = y$
$-4 = y$

To subtract 8, add -8.

$4 - (-4) = x$
$4 + 4 = x$
$8 = x$

To subtract -4, add 4.

Solve each equation.

1. $b = 16 - (-3)$ 19

2. $n = -8 - 25$ -33

3. $w = -11 - (-6)$ -5

4. $-19 - (-3) = h$ -16

5. $65 - (-45) = k$ 20

6. $-19 - 20 = c$ -39

7. $s = 100 - (-72)$ 172

8. $z = -44 - (-33)$ -11

9. $d = 89 - 17$ 72

10. $-80 - (-35) = p$ -45

11. $98 - (-90) = f$ 188

12. $-75 - 23 = g$ -98

Evaluate each expression if $w = -9$, $x = 3$, and $y = -8$.

13. $60 - w$ 69

14. $12 - y$ 20

15. $x - (-12)$ 15

16. $w - x$ -12

17. $y - w$ 1

18. $x - y$ 11

19. $-31 - y$ -23

20. $w - 50$ -59

21. $12 - x$ 9

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Study Guide Worksheet 3-6

Multiplying Integers

The product of two positive integers is positive.

Examples	$k = 4(9)$	$m = 6(7)(2)$	$j = 5(3)(5)$
	$k = 36$	$m = 42(2)$	$j = 15(5)$
		$m = 84$	$j = 75$

The product of two negative integers is positive.

Examples	$h = (-7)(-5)$	$v = (-9)^2$	$z = (-25)(-7)$
	$h = 35$	$v = -9(-9)$	$z = 175$
		$v = 81$	

The product of a positive integer and a negative integer is negative.

Examples	$c = (-20)(8)$	$g = (70)(-3)(2)$	$y = (-6)(5)^2$
	$c = -160$	$g = -210(2)$	$y = (-6)25$
		$g = -420$	$y = -150$

Solve each equation.

1. $z = 8(9)$
72

2. $t = -4(8)$
-32

3. $b = 4(-5)$
-20

4. $-5(-5) = h$
25

5. $-40(6) = n$
-240

6. $20(-9) = y$
-180

7. $2(-5)(-8) = h$
80

8. $g = -6(-3)(-2)$
-36

9. $w = -5(10)(-4)$
200

10. $t = (-20)^2$
400

11. $-10(9)^2 = p$
-810

12. $r = (5)^2 \cdot (-10)^2$
2,500

Evaluate each expression if q = -4, r = -8, and s = 10.

13. $2qr$
64

14. $-10sq$
400

15. $-8s^2$
-800

16. qrs
320

17. $-3sr$
240

18. $5r^2$
320

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Study Guide Worksheet 3-7

Dividing Integers

If two integers have the same sign, their quotient is positive.

Examples

$m = 420 \div 7$
$m = 60$

Both integers are positive. The quotient is positive.

$d = -90 \div (-9)$
$d = 10$

Both integers are negative. The quotient is positive.

If two integers have different signs, their quotient is negative.

Examples

$f = -25 \div 5$
$f = -5$

The dividend is negative. The divisor is positive. The quotient is negative.

$a = \frac{20}{-4}$
$a = -5$

The dividend is positive. The divisor is negative. The quotient is negative.

Solve each equation.

1. $81 \div -9 = c$ **-9**
2. $r = \frac{-72}{8}$ **-9**
3. $b = 680 \div 4$ **170**
4. $-325 \div (-5) = p$ **65**
5. $-700 \div 35 = y$ **-20**
6. $t = -560 \div (-80)$ **7**
7. $k = \frac{285}{19}$ **15**
8. $-96 \div (-31) = g$ **3**
9. $840 \div (-7) = z$ **-120**
10. $-189 \div 9 = j$ **-21**
11. $m = 248 \div (-4)$ **-62**
12. $z = 408 \div 51$ **8**

Evaluate each expression if $q = -48$, $r = 6$, and $t = -12$.

13. $-108 \div t$ **9**
14. $\frac{q}{-8}$ **6**
15. $312 \div r$ **52**
16. $\frac{q}{r}$ **-8**
17. $6r \div t$ **-3**
18. $-144 \div t$ **12**

Name ______________________ Date __________

Study Guide Worksheet 3-10

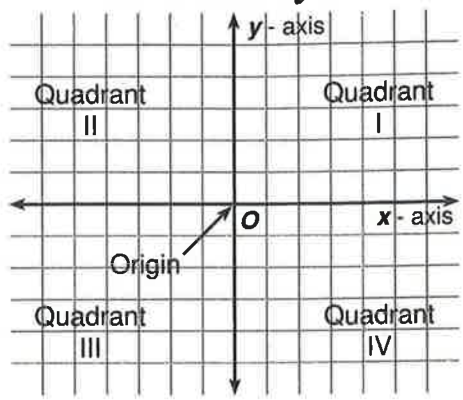
Coordinate System

You can graph a point on the coordinate plane using an ordered pair of numbers.

(x, y)

x-coordinate ↑ ↑ y-coordinate

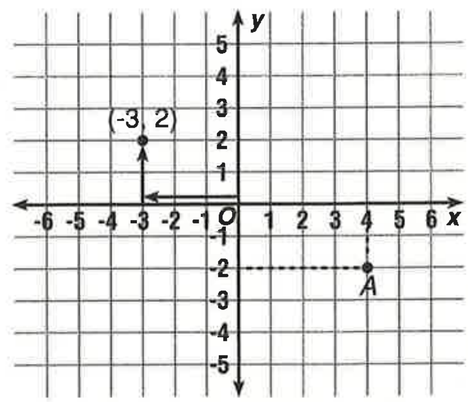
Coordinate System



Example Graph (-3, 2) on the grid below.

Begin at the origin. The x-coordinate is -3. Move 3 units to the left on the x-axis, the horizontal axis.

The y-coordinate is 2. Move 2 units up along the y-axis, the vertical axis. Draw a point to show (-3, 2).

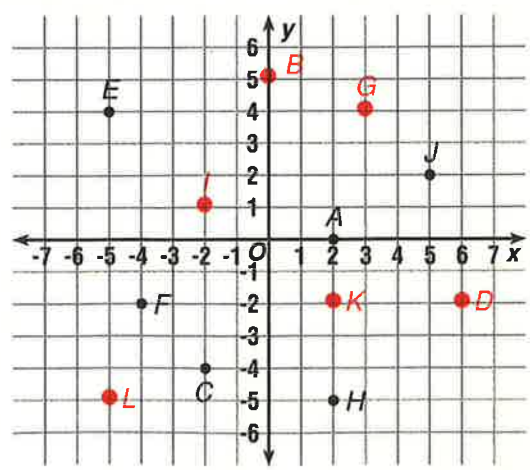


Example Name the ordered pair for point A.

Find the point on the x-axis that intersects the vertical line through point A. The x-coordinate is 4.

Find the point on the y-axis that intersects the horizontal line through point A. The y-coordinate is -2. The ordered pair for point A is (4, -2).

Name the ordered pair for the coordinates of each point graphed on the coordinate plane at the right.



1. J
(5, 2)

2. F
(-4, -2)

3. H
(2, -5)

4. C
(-2, -4)

5. A
(2, 0)

6. E
(-5, 4)

Graph each point.

7. $B(0, 5)$ **8.** $G(3, 4)$ **9.** $K(2, -2)$

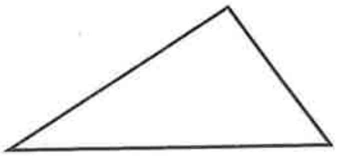
10. $L(-5, -5)$ **11.** $I(-2, 1)$ **12.** $D(6, -2)$

Name ______________________ Date ______________

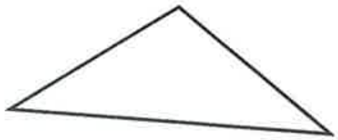
Study Guide Worksheet 5-3

Classifying Triangles

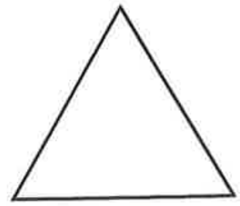
Triangles may be classified by the lengths of their sides or by the measures of their angles.



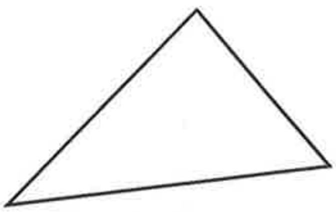
scalene
All sides are different lengths.



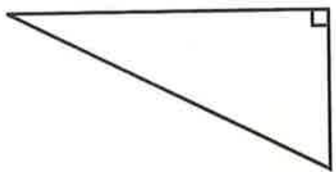
isosceles
Two sides are the same length.



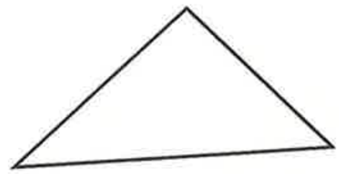
equilateral
All three sides are the same length.



acute
All three angles are acute.



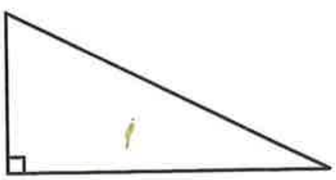
right
One angle is a right angle. The symbol ⌉ shows a right angle.



obtuse
One angle is an obtuse angle.

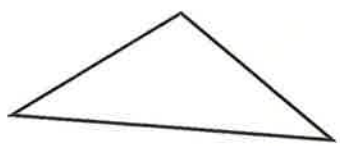
Classify each triangle by its sides and by its angles.

1.



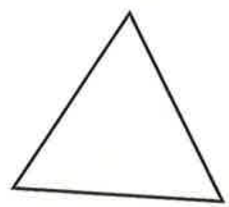
scalene, right

2.



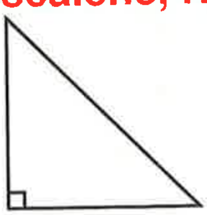
isosceles, obtuse

3.



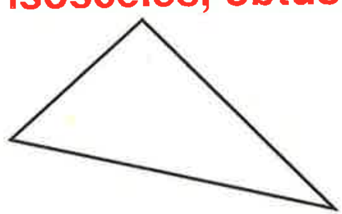
equilateral, acute

4.



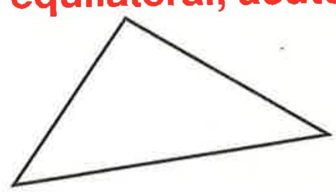
isosceles, right

5.



scalene, acute

6.



scalene, obtuse

Tell if each statement is true or false. Then draw a figure to justify your answer.

7. A right triangle can never be isosceles.
False, see Exercise 4 above.

8. A triangle can be right and equilateral.
False, equilateral triangles must have all acute angles.

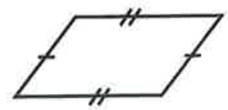
Name ________________________________ Date ______________

Study Guide Worksheet 5-4

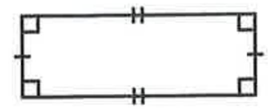
Classifying Quadrilaterals

A quadrilateral is a figure with four sides and four angles. You can use sides and angles to classify quadrilaterals.

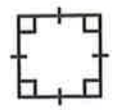
Parallelogram Opposite sides are parallel.
Opposite sides are congruent.



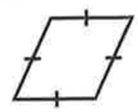
Rectangle Opposite sides are parallel.
Opposite sides are congruent.
All four angles are right angles.



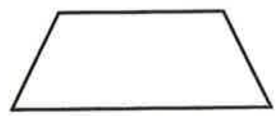
Square Opposite sides are parallel.
All four sides are congruent.
All four angles are right angles.



Rhombus Opposite sides are parallel.
All four sides are congruent.

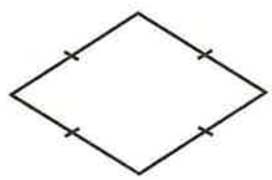


Trapezoid One pair of parallel sides.



Example Give all the names that describe each quadrilateral.

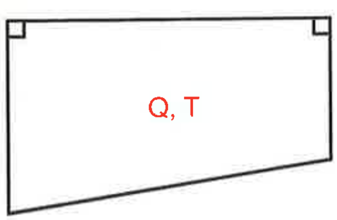
quadrilateral
parallelogram
rectangle
rhombus
square



quadrilateral
parallelogram
rhombus

Let Q = quadrilateral, P = parallelogram, R = rectangle, S = square, RH = Rhombus, and T = trapezoid. Write all letters that describe the figure.

1.



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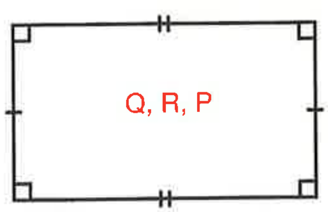

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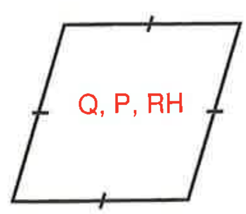

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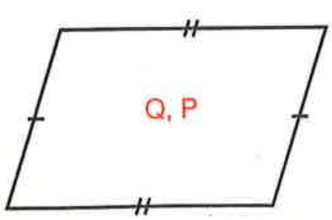

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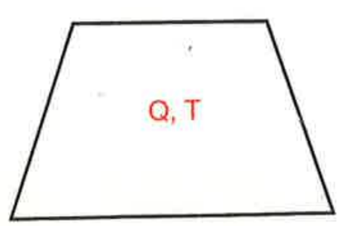

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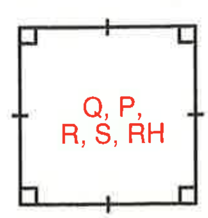

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Study Guide Worksheet 6-2

Prime Factorization

A whole number greater than 1 with exactly two factors, 1 and itself, is called a **prime number**.

Example 1 19 is a prime number. It has only 1 and 19 as factors.

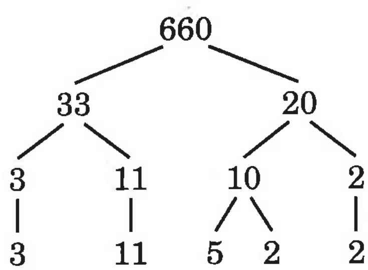
A whole number greater than 1 with more than two factors is called a **composite number**.

Example 2 18 is a composite number. It has 1, 2, 3, 6, 9, and 18 as factors.

The numbers 0 and 1 are neither prime nor composite.

A composite number may be written as the product of prime numbers. This product is the **prime factorization** of the number.

Example 3 Find the prime factorization of 660.



Write the number as the product of two factors.

Continue to factor until only prime factors remain.

The prime factorization of 660 is $3 \times 11 \times 5 \times 2 \times 2$.

Determine whether each number is prime, composite, or neither.

1. 28 composite
2. 47 prime
3. 39 composite
4. 61 prime
5. 53 prime
6. 0 neither
7. 159 composite
8. 1 neither

Find the prime factorization of each number.

9. 30 $3 \times 2 \times 5$
10. 155 31×5
11. 169 13×13
12. 100 $2 \times 2 \times 5 \times 5$
13. 86 2×43
14. 98 $2 \times 7 \times 7$
15. 495 $5 \times 3 \times 3 \times 11$
16. 40 $2 \times 2 \times 2 \times 5$

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Study Guide Worksheet 6-4

Greatest Common Factor

The greatest of the factors common to two or more numbers is the **greatest common factor (GCF)**. You can use prime factorization to find the greatest common factor.

Example 1 Find the greatest common factor of 90 and 120.

$$90 = 3 \cdot 30 = 3 \cdot 15 \cdot 2 = 3 \cdot 5 \cdot 3 \cdot 2$$

$$120 = 3 \cdot 40 = 3 \cdot 10 \cdot 4 = 3 \cdot 2 \cdot 5 \cdot 2 \cdot 2$$

90 and 120 have 2, 3, and 5 as common factors. The product of the common factors is the greatest common factor.

$2 \cdot 3 \cdot 5 = 30$

30 is the greatest common factor of 90 and 120.

Another way to find the GCF is to list all of the factors of each number. Then find the greatest number that is in both lists.

Example 2 Find the GCF of 32 and 48.

Factors of 32:	1, 2, 4, 8, 16, 32
Factors of 48:	1, 2, 3, 4, 6, 8, 12, 16, 24, 48

The common factors of 32 and 48 are 1, 2, 4, 8, and 16. The greatest common factor of 32 and 48 is 16.

Find the GCF for each set of numbers.

1. 24, 40 8

2. 18, 30 6

3. 12, 48 12

4. 36, 90 18

5. 50, 20 10

6. 15, 17 1

7. 52, 16 4

8. 63, 42 21

9. 25, 40 5

10. 36, 12, 72 12

11. 28, 49, 105 7

12. 30, 45, 75 15

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Study Guide Worksheet 6-5

Rational Numbers

Whole numbers are numbers in the set {0, 1, 2, 3, . . . }. Integers are the whole numbers and their opposites.

Rational numbers are numbers that can be expressed in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

Examples

$6\frac{1}{7}$ can be written as $\frac{43}{7}$.

0.65 can be written as $\frac{65}{100}$.

-0.7 can be written as $-\frac{7}{10}$.

58 can be written as $\frac{58}{1}$.

-79 can be written as $-\frac{79}{1}$.

0 can be written as $\frac{0}{1}$.

When a rational number is expressed as a fraction, it is commonly written in simplest form. A fraction is in simplest form when the GCF of the numerator and denominator is 1.

Example Write $\frac{18}{24}$ in simplest form.

Method 1

$18 = 2 \cdot 3 \cdot 3$
$24 = 2 \cdot 2 \cdot 2 \cdot 3$

The GCF is $2 \cdot 3 = 6$.

$$\frac{18}{24} \overset{\div 6}{\underset{\div 6}{\longrightarrow}} \frac{3}{4}$$

Since the GCF of 3 and 4 is 1, the fraction $\frac{3}{4}$ is in simplest form.

Method 2

$$\frac{18}{24} = \frac{\cancel{2} \cdot \cancel{3} \cdot 3}{\cancel{2} \cdot 2 \cdot 2 \cdot \cancel{3}} = \frac{3}{4}$$

The slashes show that the numerator and denominator are divided by $2 \cdot 3$, the GCF.

Name all the following sets of numbers to which each number belongs: whole numbers, integers, rational numbers.

1. $4\frac{1}{2}$ rational numbers
2. 14.5 rational numbers
3. 17 whole numbers, integers, rational numbers
4. 0.78 rational numbers

Write each fraction in simplest form.

5. $\frac{16}{26}$ $\frac{8}{13}$
6. $\frac{24}{72}$ $\frac{1}{3}$
7. $\frac{36}{78}$ $\frac{6}{13}$
8. $\frac{21}{56}$ $\frac{3}{8}$
9. $\frac{30}{75}$ $\frac{2}{5}$
10. $\frac{20}{48}$ $\frac{5}{12}$
11. $\frac{45}{81}$ $\frac{5}{9}$
12. $\frac{28}{49}$ $\frac{4}{7}$

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Study Guide Worksheet 6-6

Rational Numbers and Decimals

To change a fraction to a decimal, divide the numerator by the denominator.

Example Express $\frac{5}{8}$ as a decimal.

Use a calculator.

5 ÷ 8 = 0.625

$\frac{5}{8} = 0.625$

The remainder is 0. 0.625 is a terminating decimal.

Use paper and pencil.

$$\begin{array}{r} 0.625 \\ 8\overline{)5.000} \\ -48 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

Annex zeros as needed.

$\frac{5}{8} = 0.625$

A **terminating decimal** can be written as a fraction with a denominator of 10, 100, 1000, and so on.

Examples Express each decimal as a fraction or mixed number in simplest form.

$0.52 = \frac{52}{100} = \frac{13}{25}$

$-1.4375 = -1\frac{4375}{10{,}000} = -1\frac{7}{16}$

Express each fraction as a decimal.

1. $\frac{3}{5}$ 0.6
2. $-\frac{7}{10}$ -0.7
3. $-\frac{7}{4}$ -1.75
4. $-\frac{15}{32}$ -0.46875
5. $\frac{3}{20}$ 0.15
6. $5\frac{7}{25}$ 5.28
7. $-\frac{24}{16}$ -1.5
8. $-6\frac{3}{8}$ -6.375
9. $\frac{14}{35}$ 0.4
10. $\frac{5}{40}$ 0.125

Express each decimal as a fraction or mixed number in simplest form.

11. 0.08 $\frac{2}{25}$
12. -3.75 $-3\frac{3}{4}$
13. 0.015 $\frac{3}{200}$
14. -0.6 $-\frac{3}{5}$
15. 1.05 $1\frac{1}{20}$
16. -12.34 $-12\frac{17}{50}$
17. 2.1875 $2\frac{3}{16}$
18. -0.875 $-\frac{7}{8}$
19. -8.85 $-8\frac{17}{20}$
20. 9.5 $9\frac{1}{2}$

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Study Guide Worksheet 6-9

Least Common Multiple

A multiple of a number is the product of that number and any whole number. The least nonzero multiple of two or more numbers is the **least common multiple (LCM)** of the numbers.

Example Find the least common multiple of 12 and 15.

multiples of 12: 0, 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, . . .
multiples of 15: 0, 15, 30, 45, 60, 75, 90, 105, 120, 135, . . .

60 and 120 are common multiples. The LCM is 60.

Prime factorization can also be used to find the LCM.

Example Find the least common multiple of 15, 28, and 30.

$15 = 3 \cdot 5$
$28 = 2 \cdot 2 \cdot 7$
$30 = 2 \cdot 3 \cdot 5$

Find the prime factors of each number.

2 3 5 — Find the common factors.

$2 \cdot 3 \cdot 5 \cdot 2 \cdot 7 = 420$ — Multiply the common factors and any other factors.

The LCM of 15, 28, and 30 is 420.

Find the LCM for each set of numbers.

1. 9, 15
45

2. 16, 12
48

3. 42, 12
84

4. 6, 10
30

5. 21, 15
105

6. 15, 20
60

7. 9, 15, 18
90

8. 4, 10, 8
40

9. 12, 15, 24
120

10. 30, 21, 7
210

11. 13, 52, 24
312

12. 8, 14, 28
56

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Study Guide Worksheet 6-11

Scientific Notation

A number in scientific notation is written as the product of a number between 1 and 10 and a power of ten.

Example 1 Express 8.65×10^7 in standard form.

$$8.65 \times 10^7 = 8.65 \times 10{,}000{,}000$$
$$= 8.6500000.$$

Move the decimal point 7 places to the right.

$$= 86{,}500{,}000$$

Example 2 Express 9.1×10^{-4} in standard form.

$$9.1 \times 10^{-4} = 9.1 \times \frac{1}{10^4}$$
$$= 9.1 \times \frac{1}{10{,}000}$$
$$= 9.1 \times 0.0001$$
$$= 0.0009.1$$

Move the decimal point 4 places to the left.

$$= 0.00091$$

Example 3 Express 1,088,000 in scientific notation.

1.088000.

Move the decimal point to the right of the first non-zero digit.
Move the decimal point 6 places to the left.

$$1{,}088{,}000 = 1.088 \times 10^6$$

Example 4 Express 0.0000762 in scientific notation.

0.00007.62

Move the decimal point to the right of the first non-zero digit.
Move the decimal point 5 places to the right.

$$0.0000762 = 7.62 \times 10^{-5}$$

Express each number in standard form.

1. 7.02×10^4 70,200
2. 1.1×10^{-3} 0.0011
3. 6.4×10^7 64,000,000
4. 5.9×10^8 590,000,000
5. 9.12×10^{-2} 0.0912
6. 8.8×10^{-5} 0.000088

Express each number in scientific notation.

7. 0.0003 3.0×10^{-4}
8. 4,600,000 4.6×10^6
9. 0.00001653 1.653×10^{-5}
10. 518,900,000 5.189×10^8
11. 720 7.2×10^2
12. 0.114 1.14×10^{-1}

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Study Guide Worksheet 7-2

Adding and Subtracting Unlike Fractions

To add or subtract fractions or mixed numbers with unlike denominators, rename the fractions with a common denominator. Then add or subtact.

Examples

$a = -\frac{5}{8} + \left(-\frac{3}{4}\right)$	The least common denominator of 8 and 4 is 8.
$a = -\frac{5}{8} + \left(-\frac{6}{8}\right)$	Rename $-\frac{3}{4}$ as $-\frac{6}{8}$.
$a = -\frac{11}{8}$	Add.
$a = -1\frac{3}{8}$	Rename the improper fraction as a mixed number.
$c = -2\frac{3}{5} - 1\frac{1}{2}$	The least common denominator of 5 and 2 is 10.
$c = -2\frac{6}{10} - 1\frac{5}{10}$	Rename $\frac{3}{5}$ as $\frac{6}{10}$. Rename $\frac{1}{2}$ as $\frac{5}{10}$.
$c = -3\frac{11}{10}$	Subtract.
$c = -4\frac{1}{10}$	Rename $\frac{11}{10}$ as $1\frac{1}{10}$.
$r = 5\frac{1}{4} - 2\frac{2}{3}$	The least common denominator of 4 and 3 is 12.
$r = 5\frac{3}{12} - 2\frac{8}{12}$	Rename $\frac{1}{4}$ as $\frac{3}{12}$. Rename $\frac{2}{3}$ as $\frac{8}{12}$.
$r = 4\frac{15}{12} - 2\frac{8}{12}$	Rename $5\frac{3}{12}$ as $4\frac{15}{12}$.
$r = 2\frac{7}{12}$	Subtract.

Solve each equation. Write each solution in simplest form.

1. $n = \frac{3}{4} + \frac{1}{3}$
   $1\frac{1}{12}$

2. $\frac{7}{8} - \frac{2}{3} = k$
   $\frac{5}{24}$

3. $-\frac{11}{12} - \frac{1}{2} = y$
   $-1\frac{5}{12}$

4. $1\frac{1}{2} + \left(-1\frac{1}{5}\right) = v$
   $\frac{3}{10}$

5. $x = -3\frac{2}{3} + \left(-1\frac{1}{6}\right)$
   $-4\frac{5}{6}$

6. $m = 10\frac{11}{12} + 9\frac{3}{8}$
   $20\frac{7}{24}$

7. $p = 7\frac{1}{3} - \left(-2\frac{5}{9}\right)$
   $9\frac{8}{9}$

8. $-\frac{15}{16} - \frac{3}{8} = f$
   $-1\frac{5}{16}$

9. $3\frac{4}{5} - \left(-5\frac{1}{2}\right) = c$
   $9\frac{3}{10}$

10. $2\frac{3}{4} + \left(-6\frac{3}{8}\right) = a$
    $-3\frac{5}{8}$

11. $-9\frac{5}{6} - \left(-3\frac{2}{3}\right) = q$
    $-6\frac{1}{6}$

12. $m = \frac{5}{9} - \frac{1}{3}$
    $\frac{2}{9}$

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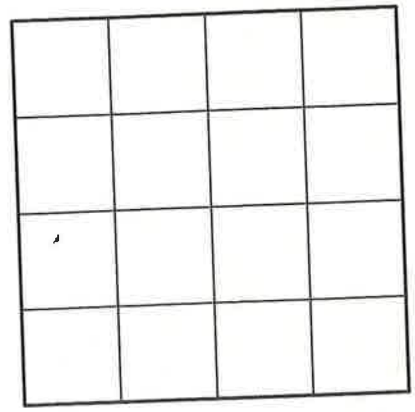
Study Guide Worksheet 8-1

Square Roots



The area of a square is equal to the square of the length of its side. For the square shown, $A = 4^2 = 16$.

The length of a side of a square is equal to the square root of the area. For the square shown, 4 is the square root of 16.

If $x^2 = y$, then x is a square root of y. The symbol $\sqrt{\ }$ is called a radical sign. Read $\sqrt{16}$ as "the square root of 16."

Examples

x	$x^2 = y$	$\sqrt{y} = x$	
4	$4 \times 4 = 4^2 = 16$	$\sqrt{16} = 4$	principal square root
-4	$-4 \times -4 = (-4)^2 = 16$	$-\sqrt{16} = -4$	negative square root
1.5	$1.5^2 = 2.25$	$\sqrt{2.25} = 1.5$	
-1.5	$(-1.5)^2 = 2.25$	$-\sqrt{2.25} = -1.5$	

To find a square root, think of a number that when multiplied by itself (squared) equals the number under the radical sign.

Examples Find each square root.

$\sqrt{\frac{49}{64}}$ $\quad \frac{7}{8} \times \frac{7}{8} = \frac{49}{64}$ $\quad \sqrt{\frac{49}{64}} = \frac{7}{8}$

$-\sqrt{0.25}$ $\quad (-0.5)^2 = 0.25$ $\quad -\sqrt{0.25} = -0.5$

Find each square root.

1. $\sqrt{100}$ 10
2. $-\sqrt{144}$ -12
3. $\sqrt{81}$ 9
4. $-\sqrt{0.64}$ -0.8
5. $\sqrt{\frac{9}{16}}$ $\frac{3}{4}$
6. $-\sqrt{6.25}$ -2.5
7. $\sqrt{169}$ 13
8. $-\sqrt{25}$ -5
9. $-\sqrt{121}$ -11
10. $\sqrt{\frac{25}{81}}$ $\frac{5}{9}$
11. $-\sqrt{0.16}$ -0.4
12. $\sqrt{225}$ 15

13. $-\sqrt{10{,}000}$ -100

10. $\sqrt{400}$ 20

11. $-\sqrt{1.21}$ 1.1

12. $\sqrt{1.44}$ -1.2

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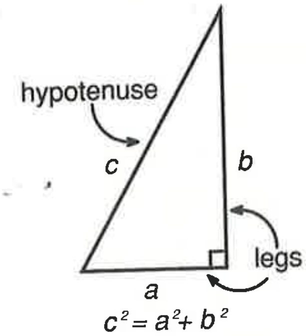
Study Guide Worksheet 8-5

The Pythagorean Theorem

The longest side of a right triangle is the **hypotenuse**.
The hypotenuse is the side opposite the right angle.
The other two sides of the triangle are the **legs**.



The Pythagorean Theorem relates the lengths of the sides of a right triangle. The Pythagorean Theorem states: For any right triangle, the square of the hypotenuse is equal to the sum of the squares of the legs. You can use the Pythagorean Theorem to find the length of a side of a right triangle if the lengths of the other two sides are known.

Examples

If $a = 30$ and $b = 40$, find c.
$c^2 = a^2 + b^2$
$c^2 = 30^2 + 40^2$
$c^2 = 900 + 1{,}600$
$c^2 = 2{,}500$
$c = \sqrt{2{,}500}$
$c = 50$
The length of the hypotenuse is 50 meters

If $c = 20$ and $a = 15$, find b.
$c^2 = a^2 + b^2$
$20^2 = 15^2 + b^2$
$400 = 225 + b^2$
$400 - 225 = b^2$
$175 = b^2$
$\sqrt{175} = b$
$13.228757 = b$
The length of the leg 13.2

The converse of the Pythagorean Theorem can be used to test whether a triangle is a right triangle.
Converse of the Pythagorean Theorem: If the sides of a triangle have lengths a, b, and c, such that $c^2 = a^2 + b^2$, then the triangle is a right triangle.

Find the missing measure for each right triangle. Round decimal answers to the nearest tenth.

1. $a = 8$ m, $c = 10$ m
$b = 6$ m

2. $a = 5$ ft, $b = 12$ ft
$c = 13$ ft

3. $b = 15$ cm, $c = 25$ cm
$a = 20$ cm

4. $a = 7$ km, $c = 12$ km
$b = 9.7$ km

5. $a = 8$ yd, $b = 11$ yd
$c = 13.6$ yd

6. $b = 14$ in., $c = 20$ in.
$a = 14.3$ in.

Determine whether each triangle with sides of the given lengths is a right triangle.

7. 20, 21, 29
yes

8. 7, 24, 25
yes

9. 9, 11, 14
no

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Study Guide Worksheet 10-1

The Percent Proportion

A percent is a ratio that compares a number to 100. *Percent* means per hundred. To find the percent for a fraction, you can solve a proportion.

Example

$$\frac{13}{8} = \frac{x}{100}$$
$$8x = 1300$$
$$x = 162.5$$
$$\frac{13}{8} = 162.5\%$$

You can use the percent proportion to solve problems. $\frac{P}{B} = \frac{r}{100}$ $\frac{\text{Percentage}}{\text{Base}} = \frac{\text{rate}}{100}$

Examples

37.2 is what percent of 186?

$$\frac{P}{B} = \frac{r}{100}$$
$$\frac{37.2}{186} = \frac{r}{100}$$
$$186r = 3720$$
$$r = 20$$

37.2 is 20% of 186.

What number is 15% of 280?

$$\frac{P}{B} = \frac{r}{100}$$
$$\frac{P}{280} = \frac{15}{100}$$
$$100P = 4200$$
$$P = 42$$

42 is 15% of 280.

Express each fraction as a percent.

1. $\frac{23}{100}$ 23%
2. $\frac{3}{4}$ 75%
3. $\frac{11}{20}$ 55%
4. $\frac{13}{25}$ 52%
5. $\frac{29}{50}$ 58%
6. $\frac{7}{8}$ 87.5%
7. $\frac{12}{4}$ 300%
8. $\frac{28}{1,000}$ 2.8%
9. $\frac{12}{5}$ 240%
10. $\frac{14}{10}$ 140%

Write a percent proportion to solve each problem. Round answers to the nearest tenth.

11. What is 40% of 160? 64
12. 75 is what percent of 375? 20%
13. 45 is 25% of what number? 180
14. 14.5 is 5% of what number? 290
15. Find 12% of 260. 31.2
16. 63 is what percent of 420? 15%

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Study Guide Worksheet 10-2

Fractions, Decimals, and Percents

To express a decimal as a percent, first write the decimal as a fraction with a denominator of 100. Then express the fraction as a percent.

Examples $0.3 = \frac{3}{10} = \frac{30}{100}$ or 30% $\qquad 0.175 = \frac{175}{1{,}000} = \frac{17.5}{100}$ or 17.5%

To express a fraction as a percent, divide the numerator by the denominator to find a decimal in hundredths. Then write the percent for the decimal.

Examples $\frac{7}{20} = 7 \div 20 = 0.35 = \frac{35}{100}$ or 35% $\qquad \frac{5}{12} = 5 \div 12 = 0.4166667$ or about $0.42 = \frac{42}{100} = 42\%$

To express a percent as a fraction, write the percent as a fraction with a denominator of 100 and simplify.

Examples $5\% = \frac{5}{100} = \frac{1}{20}$ $\qquad 23.5\% = \frac{23.5}{100} = \frac{235}{1{,}000}$ or $\frac{47}{200}$

To express a percent as a decimal, write the percent as a fraction with a denominator of 100 and then express the fraction as a decimal.

Examples $56\% = \frac{56}{100} = 0.56$ $\qquad 3.4\% = \frac{3.4}{100} = \frac{34}{1{,}000} = 0.034$

Determine which is greater.

1. 30% or $\frac{1}{3}$ $\quad \frac{1}{3}$
2. 0.9 or 88% $\quad$ 0.9
3. $\frac{5}{6}$ or 80% $\quad \frac{5}{6}$

Express each decimal as a percent.

4. 0.13 $\quad$ 13%
5. 0.06 $\quad$ 6%
6. 0.765 $\quad$ 76.5%
7. 0.0122 $\quad$ 1.22%

Express each percent as a fraction in simplest form.

8. 22% $\quad \frac{11}{50}$
9. 65% $\quad \frac{13}{20}$
10. 43.3% $\quad \frac{433}{1{,}000}$
11. 12.5% $\quad \frac{1}{8}$

Express each percent as a decimal.

12. 45% $\quad$ 0.45
13. 91% $\quad$ 0.91
14. 24.5% $\quad$ 0.245
15. 8.37% $\quad$ 0.0837

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Study Guide Worksheet 10-3

Large and Small Percents

To express a percent greater than 100% or less than 1% as a fraction, write the percent as a fraction with a denominator of 100 and simplify.

Examples

$0.4\% = \frac{0.4}{100} = \frac{4}{1{,}000} = \frac{1}{250}$

$175\% = \frac{175}{100} = 1\frac{75}{100} = 1\frac{3}{4}$

$\frac{1}{6}\% = \frac{\frac{1}{6}}{100} = \frac{1}{6} \div 100 = \frac{1}{6} \times \frac{1}{100} = \frac{1}{600}$

To express a percent greater than 100% or less than 1% as a decimal, write the percent as a fraction with a denominator of 100 and then express the fraction as a decimal.

Examples

$254\% = \frac{254}{100} = 2.54$

$0.05\% = \frac{.05}{100} = \frac{5}{10{,}000} = 0.0005$

$\frac{5}{8}\% = \frac{\frac{5}{8}}{100} = \frac{5}{8} \div 100 = \frac{5}{8} \times \frac{1}{100} = \frac{5}{800} = 0.00625$

Express each percent as a fraction or mixed number in simplest form.

1. 0.8% $\frac{1}{125}$
2. 0.09% $\frac{9}{10{,}000}$
3. 853% $8\frac{53}{100}$
4. 420.5% $4\frac{41}{200}$
5. 674% $6\frac{37}{50}$
6. $\frac{1}{2}\%$ $\frac{1}{200}$
7. $\frac{3}{50}\%$ $\frac{3}{5{,}000}$
8. 0.15% $\frac{3}{2{,}000}$

Express each percent as a decimal.

9. 716% 7.16
10. 0.07% 0.0007
11. 1463% 14.63
12. 0.9% 0.009
13. $\frac{3}{10}\%$ 0.003
14. 0.004% 0.00004
15. 900% 9
16. 1,001% 10.01

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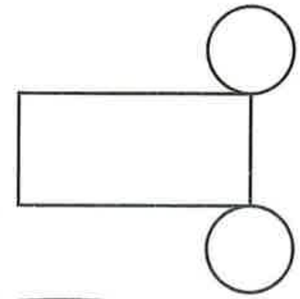
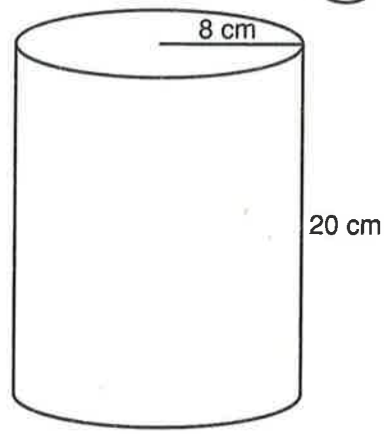
Study Guide Worksheet 12-5

Surface Area of Cylinders

The surface area of a cylinder is equal to the sum of the areas of the two circular bases plus the area of the rectangle that forms the curved side. The length of the rectangle is equal to the circumference of the base.



Example Find the surface area of the cylinder.



area of each base:

$A = \pi r^2$
$A = 3.14(8)^2$
$A = 3.14(64)$
$A = 200.96$

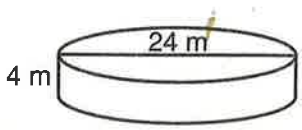
area of the rectangle:

$A = lw$
$A = 2\pi(r)(w)$
$A = 2(3.14)(8)(20)$
$A = 6.28(160)$
$A = 1{,}004.8$

Total surface area = 200.96 + 200.96 + 1,004.8 or 1,406.72. The surface area of the cylinder is 1,406.72 square centimeters.

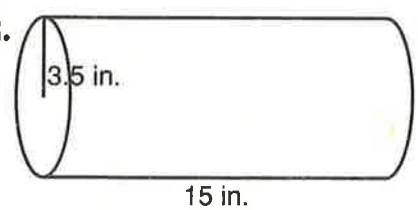
Find the surface area of each cylinder.

1.



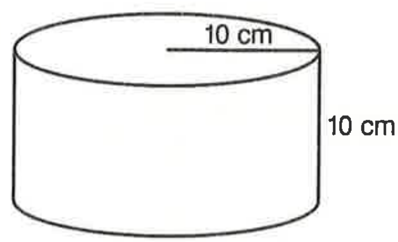
1,205.76 m^2

2.



406.63 in^2

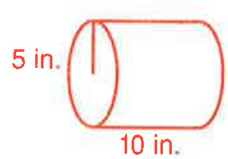
3.



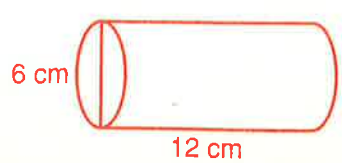
1,256 cm^2

Draw each cylinder. Then find its surface area.

4. The radius of the base is 5 inches. The height is 10 inches. 471 in^2



5. The diameter of the base is 6 centimeters. The height is 12 centimeters. 282.6 cm^2



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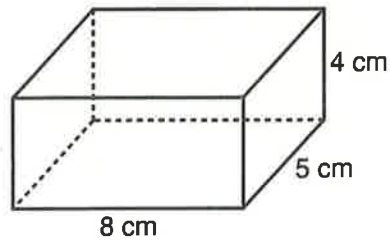
Study Guide Worksheet 12-6

Volume of Prisms and Cylinders

The volume (V) of a prism is equal to the product of the area of the base (B) times the height (h). $V = Bh$

Example 1 Find the volume of the rectangular prism.



$V = Bh$
$V = lwh$ area of the base $= lw$
$V = 4 \times 5 \times 8$
$V = 160$

The volume of the rectangular prism is 160 cubic centimeters.

The volume (V) of a cylinder is equal to the product of the area of the base (B) times the height. $V = Bh$ Since the area of the base $= \pi r^2$, the volume of the cylinder may be expressed as $V = \pi r^2 h$.

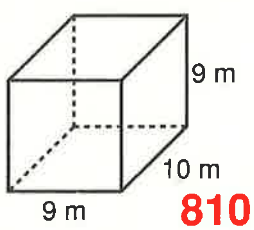
Example 2 Find the volume of the cylinder.

$V = \pi r^2 h$
$V = 3.14(5)^2(12)$
$V = 3.14(25)(12)$
$V = 942$

The volume of the cylinder is 942 cubic feet.

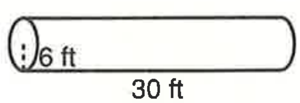
Find the volume of each solid.

1.



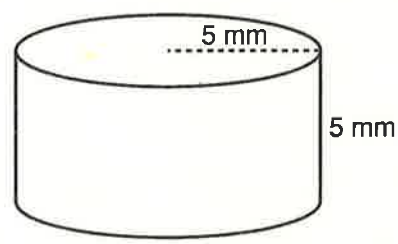
810 m^3

2.



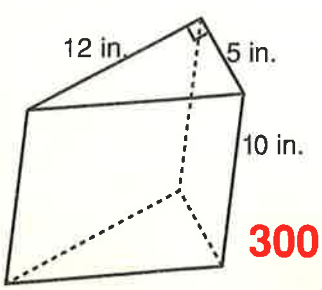
3,391.2 ft^3

3.



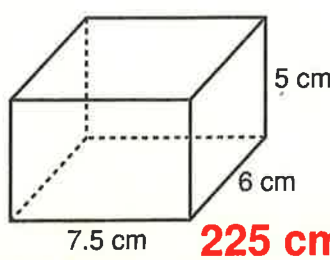
392.5 mm^3

4.



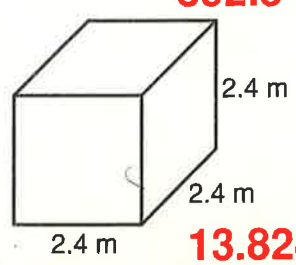
300 in^3

5.



225 cm^3

6.



13.824 m^3

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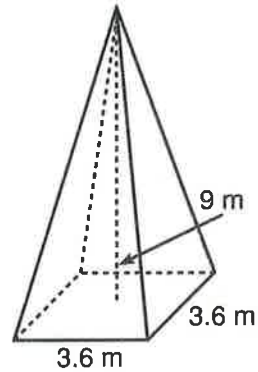
Study Guide Worksheet 12-7

Volume of Pyramids and Cones

The volume (V) of a pyramid equals one-third the area of the base (B) times the height (h).

$$V = \frac{1}{3}Bh$$



Example 1 Find the volume of the square pyramid.

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}s^2h$ Since the base is a square, $B = s^2$.

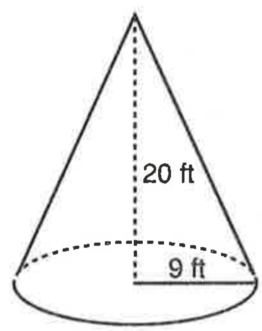
$V = \frac{1}{3}(3.6)^2(9)$

$V = \frac{1}{3}(12.96)(9)$

$V = 38.88$

The volume of the pyramid is 38.88 cubic meters.

The volume (V) of a cone equals one-third of the area of the base (B) times the height (h). $V = \frac{1}{3}Bh$ Since the area of the base $= \pi r^2$, the volume of a cone may be expressed as $V = \frac{1}{3}\pi r^2 h$.



Example 2 Find the volume of the cone.

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}(3.14)(9)^2(20)$

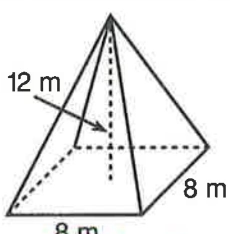
$V = \frac{1}{3}(3.14)(81)(20)$

$V = 1{,}695.6$

The volume of the cone is about 1,695.6 cubic feet.

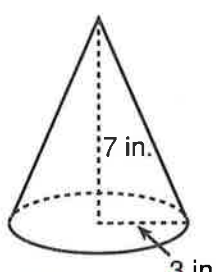
Find the volume of each solid.

1.



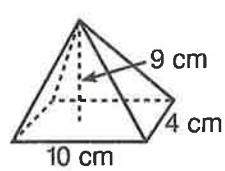
256 m^3

2.



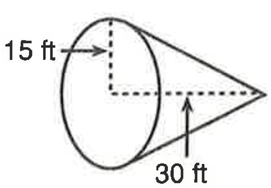
65.94 in^3

3.



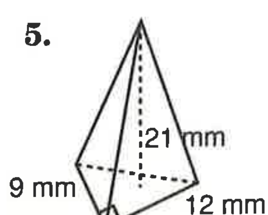
120 cm^3

4.



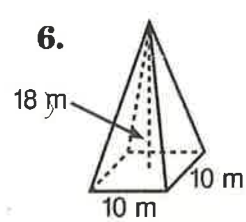
7,065 ft^3

5.



378 mm^3

6.



600 m^3